

# FACTORS AFFECTING THE ECOLOGICAL FOOTPRINTS OF ACADEMICIANS: A CASE STUDY FROM DICLE UNIVERSITY, TÜRKİYE

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**Abstract.** Human beings recklessly consume the resources of the environment they are a part of, which can result in the end of the planet and themselves. Since there is no other planet suitable for life, it is essential to protect the Earth. Humans, who have the most active role in the ecosystem, are also the first actor in disrupting the ecological balance. It is known that the damage caused by humans to nature is related to environmental consciousness. Another known fact is that the level of environmental awareness differs according to different segments of society. In this study, the factors affecting the "ecological footprint" awareness levels of academicians, who are generally assumed to have the highest level of awareness in society, were examined among the academicians of Dicle University. The research was conducted in a cross-sectional survey model. The variables of the study are gender, place of residence during childhood, marital status, faculty worked in, and education level of parents. Quantitative data was collected and analyzed using the "Ecological Footprint Awareness Scale". Descriptive statistical techniques, regression analysis, and semi-structured interview techniques were used in data analysis.

**Keywords:** *logistic regression, environmental consciousness, cross-sectional data, Likert scale*

## Introduction

The issues of environment, resources, and scarcity have been on the agenda of the scientific community for a very long time. It is now widely accepted that Thomas Robert Malthus was not wrong in his controversial ideas about "scarcity" which he put forth in 1789. Research indicates that the planet's resources are rapidly being depleted and carrying capacity is decreasing. It is a common belief that countries, social or economic classes, are all responsible for ecological destruction in varying proportions depending on their levels of consumption patterns and development. The increase in the ecological footprint, determined by the amount of food, housing area, transportation, and waste generated by a consumption society or individual in relation to its counterpart in ecosystems, results in the disappearance of biological resources. Ecological footprints are a method developed to measure how much pressure is put on nature and how much the ecological carrying capacity is exceeded while meeting needs. In many studies conducted using this method, it has been observed that the ecological footprint of wealthy countries is several times that of poor countries, 2000:368. Life on Earth could only emerge two million years after the Earth was formed. However, it took only two hundred years for the industrial society to produce pollution that would threaten the life forms (Dinçer, 1996). The parallel relationship between modern society and technology use has led to an increase in human living standards but has also resulted in a cost to nature and other living creatures (Kışlalıoğlu and Berkes, 1991). The environmental impasses of modern society

have been expressed in various ways since the beginning of industrialization. At the beginning of the 19th century, George Perkins Marsh stated that the changing production approach with industrialization did not allow nature to renew itself and overused it (Turgut, 2001). The basic feature of the consumption society is that, as a requirement of industrialization, the produced goods are distributed widely and rapidly and it is a society that constantly urges and forces its members to consume more (Öztunalı Kayır, 2003). Liberalism, whose primary goal is to create new markets and increase consumption, is implanting new consumption patterns with its mass communication tools and is burdening the planet with unnecessary loads in the production and consumption processes instead of fulfilling human needs (Demirer et al., 1999). In this sense, the consumption habits of countries are being emphasized as a factor that reduces the planet's biological capacity and narrows living spaces (Öztunalı Kayır, 2003). Because if today's consumption continues at this rate, it has become a reality that many environmental problems will be experienced beyond the prediction of climate change (Gümüş and Şişman, 2014; Akyüz et al., 2016). Humans, who have the most active role in the ecosystem where living and non-living environments are together, have the responsibility to protect, not pollute, and improve the environment.

The human beings, who have the most active role in the ecosystem where living and non-living environments coexist, undoubtedly have a great responsibility in protecting, not polluting, and improving the environment (Öztürk, 2010; Gül, 2013). It is very important for individuals who make up the society to have environmental awareness in exhibiting correct behaviors towards the environment (Kurt-Konakoğlu, 2020). The scarcity of natural resources, which are increasingly less available in the face of individuals' needs, has been understood to require careful use of resources and is a necessity for a sustainable environment. Environmental awareness means that individuals acquire environmental sensitivity socially, take initiatives to solve environmental problems and defend their rights, realize the need to use the environment without destroying it, and emphasize savings in all consumption habits (Kızılaslan and Kızılaslan, 2005; Öztekin, 2006). Individuals with environmental awareness result in not harming the environment, exhibiting environmentally friendly behaviors, and adopting conscious consumption and environmentally friendly production understanding for the solution of environmental problems (Çifci and Şakacı, 2015; Onur et al., 2016). Environmental awareness forms the basis for the thought that humans should have both in preventing environmental problems and in protecting the environment. Environmental awareness requires being aware of the environment and being able to behave in accordance with it (Nazlıoğlu, 1991). In other words, it is thought that individual behavior changes over time after environmental awareness and the implementation of related practices in individuals' lives, so individual awareness and the factors affecting it are important.

It is stated that values have an impact on behavior through attitudes (Homer and Kahle, 1988). A study identifying the relationship between education and the environment indicates that individuals become more knowledgeable about environmental issues as their level of education increases, leading to an increase in their concerns about environmental issues (Mainieri et al., 1997). Scientifically revealing individual and social factors that influence environmental behaviors of individuals is a very important issue (Kalantari and Asadi, 2010). Environmental attitude is the combination of beliefs, influence, and behavioral intentions that an individual has towards environmental activities or problems (Milfont and Duckitt, 2004). Individuals are not born with attitudes. They develop their attitudes throughout their lives based on their own experiences, what

other people tell them, especially those they interact with, and sometimes on the interaction of both. Individuals with a positive attitude towards an object or phenomenon are thought to be inclined to act positively towards it, support it, help it, and protect it. It is generally assumed that as the level of education increases, individuals become more knowledgeable about the environment, and this enhances their environmental awareness. However, there is limited or no evidence to support this assumption.

This study aimed to reveal whether the impact of education on ecological footprints is significant and what other factors are effective on it. To this end, instead of sampling all segments of society, academics, the most educated segment were purposively selected. Based on the "ecological footprints" of academicians, at the case of Dicle University, the factors affecting their environmental perspectives and behaviours and the degree of their impact were investigated. It is expected that the knowledge of how educated people approach environmental problems may help to reduce the "ecological footprint" and make a significant contribution to the environmental policies to be developed to create a general environmental consciousness and awareness in society.

## **Material and methods**

### ***Material***

The factors affecting the ecological footprint of the academicians at Dicle University were investigated in this study. So, the research material consists of data collected from the academicians at this university.

### ***Data collection***

Study data were collected through structured questionnaires during face-to-face interviews. The structured questionnaire form consists of two parts. The first part includes demographic data, i.e. sex, the settlement, where lived the longest, marital status, education level of the parents, etc., while the second part consisted of the ecological footprint awareness scale. This 1-5 Likert-type scale consists of a total of 46 questions revealing the spending and usage behaviours of the respondents on food, transportation, shelter, energy, waste and water consumption.

The semi-structured interview method was also used to deepen and objectify the comments (Mason, 1996).

The written consent of the respondents was obtained at the beginning of the questionnaire forms. Thus, willing respondents proceeded with answering the questions and completing the forms. The respondents participated voluntarily and willingly in the study, being aware that none of the questions in the questionnaire violated their human rights.

### ***Sampling***

According to the records of the year 2021, Dicle University had 1882 academic staff, including 341 professors, 175 associate professors, 270 assistant professors, 266 lecturers and 830 research assistants in the academic units of 15 faculties, five junior colleges and 12 vocational schools in 2021 (Dicle University, 2021).

The sampling frame of the study covered the all-academic personnel of all academic units in Dicle University. However, considering that some units did not have personnel at all academic titles only the faculties were included in the study and junior college and

vocational schools were excluded. So, the sampling frame of the study was composed of 1529 academic staff at 13 faculties. Considering the difficulties in reaching all academicians the following simple random proportional sampling technique was used in determination of the sample size (Çiçek and Erkan, 1996).

$$n = \frac{N p (1-p)}{(N-1)D^2 + p(1-p)} \quad (\text{Eq.1})$$

$$D = \frac{d}{Z_{\sigma/2}} \quad (\text{Eq.2})$$

where:

n = Sample size,

N = Total number of academicians,

d = Deviation from the mean (7%),

$Z_{\sigma/2}$  = Z scale value at 95% confidence interval (1,96),

D = d/  $Z_{\sigma/2}$ ,

p = Probability of academicians to be sampled to interview (It was 0.50 to reach the maximum sample size).

$$D = \frac{0,07}{1,96} = 0,035 \quad (\text{at 95\% confidence interval})$$

$$n = \frac{1529 \times 0,5 (1-0,5)}{(1529-1) \times 0,035^2 + 0,5(1-0,5)}$$

$$n = \frac{382,25}{2,20} = 174 \text{ academician}$$

Sample size was calculated to be 174 but it was increased to 192 by about 10% considering the probability of incomplete questionnaires, and 187 were evaluated.

### ***Handling the data***

The Ecological Footprint Awareness Scale, developed by Coşkun and Sarıkaya (2013), was used to measure the ecological footprint of the academicians.

Ecological footprint was calculated from the questions directed at the respondents to qualify their consciousness status. Correct or meaningful answers were scored using 1-5 Likert scale, where 1 indicates strong disagreement and 5 indicates strong agreement. The dependent 'footprint' variable was computed according to the average of scores calculated for each respondent. For this purpose, the top fourth of the maximum average score (greater than 3,75) was accepted to be conscious and given the value 0 as the rest of the respondents were accepted unconscious and given the value 1. That is, the ecological footprint is a dummy variable taking values of 0 and 1, where 1 indicates presence of footprint and zero indicates else.

The Ecological Footprint Awareness Scale has budget, food, and environment-waste sub-dimensions. Questions about the attitudes towards controlling money were made of the budget sub-dimension while the questions about the food preferences and eating habits were evaluated together to establish food sub-dimension. On the other hand, the questions towards measuring the respondents' environmental consciousness were interpreted as the environment-waste management sub-dimension. Budget, food and

environment sub-dimensions are all dummy variables and were encoded following the same procedure explained for the dependent variable.

Some explanatory variables such as education level and faculty of affiliation were re-coded by merging closer categories to ensure the sufficient number of observations in all categories. Study variables and their definitions were given in *Table 1*.

**Table 1.** Definitions of the study variables

| Variables                                       | Definitions                                                                                                                                                     |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sex                                             | 1: Female; 2: Male                                                                                                                                              |
| Age                                             | Age of the respondent (year)                                                                                                                                    |
| Place of Childhood                              | 1: Village; 2: Town; 3: City                                                                                                                                    |
| Academic Rank                                   | 1: Lecturer or assistant professor; 2: Associate professor; 3: Professor                                                                                        |
| Father's education                              | 1: Primary or intermediate; 2: Highschool or higher                                                                                                             |
| Mother's Education                              | 1: Primary or intermediate; 2: Highschool or higher                                                                                                             |
| Marital Status and the Spouse's Education Level | 1: Single; 2: Elementary or high school; 3: Associate degree or higher                                                                                          |
| Faculty of Affiliation                          | 1: Medicine and veterinary; 2: Science, Architecture and Agriculture; 3: Law and Administrative Sciences; 4: Literature and theology; 5: Dentistry; 6: Pharmacy |
| Footprint                                       | 1: Presence of footprint; 0: Else                                                                                                                               |
| Budget Sub-Dimension                            | 1: Presence of footprint; 0: Else                                                                                                                               |
| Environment Sub-Dimension                       | 1: Presence of footprint; 0: Else                                                                                                                               |
| Food Sub-Dimension                              | 1: Presence of footprint; 0: Else                                                                                                                               |

### Data analysis

Descriptive statistical analysis and logistic regression methods were used in data analysis. The former was used to determine the current situation of the academicians, as the latter was adopted to determine the factors associated with the ecological footprint of the academicians of Dicle University. Moreover, a reliability analysis was performed on the ordinal data obtained according to the Ecological Footprint Awareness Scale. Cronbach's alpha statistic was calculated for this purpose. The alpha value obtained for all ordinal data on a 1-5 Likert scale indicates the total reliability of the survey. Alpha values greater than 0.7 indicate high reliability as lower values represent the opposite. In our study we calculated an alpha value of 0.88, confirming the high reliability of ordinal data (Tavakol and Dennick, 2011).

In our study, logistic regression method was used to determine the factors effective on footprint of academicians because the dependent variable (ecological footprint) is a binary variable, indicating two states of an event, i.e., presence or absence, occurrence, or non-occurrence, etc. The dependent variable takes the value of 1 if an event occurs or zero otherwise. There may be many independent variables describing the dependent variables (Gujarati, 1995).

In logit models, the log odds of occurrence of an event are estimated in the form of a multiple linear regression function as defined in *Equations 3, 4 and 5*.

$$P_i = E(Y = 1|x_i) = \frac{1}{1+e^{-\beta_0+\beta_1x_1+\beta_2x_2+\dots+\beta_nx_n+e}} \quad (\text{Eq.3})$$

For ease of understanding, the formula could be shown as follows.

$$P_i = \frac{1}{1+e^{-Z_i}} \quad (\text{Eq.4})$$

In which,  $Z$  is a multiple linear regression function as in Eq. 5 with which the log odds of an event are estimated.

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + e \quad (\text{Eq.5})$$

where;  $Y$  represents the dependent variables of ecological awareness,  $p$  denotes the probability of the respondents to be aware of ecology  $Y=1$  to be occur, as  $x_1, x_2, x_3, \dots, x_n$  indicate the regressor variables and  $\beta_1, \beta_2, \beta_3, \dots, \beta_n$  show slope coefficients for the regressors of  $x_1, x_2, x_3, \dots, x_n$  respectively. Moreover,  $\beta_0$  denotes the constant term and  $e$  represents the error term.

Logistic regression does not require the key assumptions of linear regression based on ordinary least-squares, such as linearity, normality, and homoscedasticity.

In logit models, likelihood ratio LR and Wald test show the significance of the model as the pseudo- $R^2$  value indicates the goodness of fit. In Stata, when running logit models LR, Wald test and pseudo- $R^2$  values are calculated by default. So, the model was tested for the specification error and multicollinearity using linktest and variance inflation factor VIF separately. Moreover, an extra goodness of fit test was conducted using Pearson  $X^2$  and Hosmer-Lemeshow tests for the model (Cameron and Trivedi, 2010; Adkins and Hill, 2011).

The linktest did not rejected the null hypothesis since  $p$  values were 0.000 and 0,818 for yhat and squared yhat, respectively. Again, calculated VIF values proved the absence of serious multicollinearity. Moreover, Pearson  $X^2$  and Hosmer-Lemeshow tests indicated that the estimated model fitted quite well  $p>0.1$ .

Since the slope coefficients in logistic regression cannot be treated as the marginal effect of the independent variables over dependent variable at ceteris paribus assumption, there is a need to see the effect of the independent variables on the dependent variable to interpret the calculated coefficients in such models. Calculus and finite difference methods are used for this purpose, and we employed finite difference methods here because it gives better results in binary variables (Cameron and Trivedi, 2010).

Regression models may have both quantitative and qualitative types of regressors. In a regression model, categorical variables are represented by one less dummy variable than the number of categories. In general, the lowest category is not represented in the model and the coefficients of dummy variables for the other categories are interpreted in relation to this omitted reference category (Gujarati, 2011).

On the other hand, due to the data obtained from the respondents of different faculties, we adjusted the standard errors of the model to six clusters using the clustered robust standard errors procedure (Adkins and Hill, 2011).

Data analysis was performed using SPSS 23.0 IBM, 2015 and Stata SE 14.2 StataCorp, 2015 software packages.

## Results

### *Descriptive analysis results*

The study population consisted of academics working at the faculties of medicine, science, architecture, agriculture, law, literature, economics, theology, dentistry, and

veterinary medicine at Dicle University. Of those included in the study, 30% were female and 70% were male out of 187 academics (*Table 2*).

**Table 2.** Demographic details and affiliations of the respondents

| Faculty of Affiliation                | Female |      | Male               |     | Tot. | Age                | N   | Sex    | N                         | %   |      |
|---------------------------------------|--------|------|--------------------|-----|------|--------------------|-----|--------|---------------------------|-----|------|
|                                       | N      | %    | N                  | %   | N    | Min                | 25  | Female | 56                        | 30  |      |
| Medicine                              | 16     | 36   | 29                 | 64  | 45   | Max                | 68  | Male   | 131                       | 70  |      |
| Science, Architecture and Agriculture | 12     | 29   | 30                 | 71  | 42   | Mean               | 41  | Tot.   | 187                       | 100 |      |
| Law, Literature and Economics         | 8      | 35   | 15                 | 65  | 23   | Marital Status     |     |        | Spouse's Education        |     |      |
| Theology                              | 8      | 22   | 28                 | 78  | 36   |                    | N   | %      |                           | N   | %    |
| Dentistry                             | 3      | 14   | 19                 | 86  | 22   | Married            | 128 | 68.4   | Elementary or High School | 32  | 25   |
| Veterinary Medicine                   | 9      | 47   | 10                 | 53  | 19   | Single             | 59  | 31.6   | Bachelor or above         | 96  | 75   |
| Total                                 | 56     | 30   | 131                | 70  | 187  | Total              | 187 | 100    | Tot.                      | 128 | 100  |
| Academic Degree                       |        |      | Father's Education |     |      | Mother's Education |     |        | Place of the Childhood    |     |      |
|                                       | N      | %    |                    | N   | %    |                    | N   | %      |                           |     |      |
| Research Assistant or Lecturer        | 68     | 36.4 | Elementary         | 103 | 55.1 | Elementary School  | 144 | 77     | Village                   | 25  | 13.4 |
| Associate Professor                   | 79     | 42.2 | High school above  | 84  | 44.9 | High school-above  | 43  | 23     | Town                      | 34  | 18.2 |
| Professor                             | 40     | 21.4 | Total              | 187 | 100  | Total              | 187 | 100    | City                      | 128 | 68.4 |
| Total                                 | 187    | 100  |                    |     |      |                    |     |        | Total                     | 187 | 100  |

The academics who made up the research population were distributed across faculties as follows: 24% in medicine, 22.5% in science, architecture, and agriculture, 12.2% in law, literature, and economics, 19.3% in theology, 11.7% in dentistry, and 10.3% in veterinary medicine. Of all the academicians, 36.4% were research assistants, 42.2% were assistant professors and associate professors, and 21.4% were full professors. Of the academics, 68.42% were married and 31.6% were single. It was observed that 13.4% of the academics grew up in rural areas, 18.2% in towns, and 68.4% in cities.

When the education levels of the spouses of married academics were examined, it was seen that 25% had a high school diploma or less, while 75% had a college or postgraduate education (*Table 3*). Regarding the education level of parents, it was found that 55.1% of the fathers of the academics graduated from primary and secondary schools, while 44.9% graduated from high schools and above, and 77% of the mothers were primary and secondary school graduates, while 23% were high school and above graduates (*Table 3*).

Since awareness levels in sub-dimensions either decrease or increase the Ecological Footprint of those sub-dimensions, the relationship between awareness levels in Ecological Footprint sub-dimensions by the faculties was examined (*Table 4*).

It has been observed that the budget sub-dimension is the one with the highest level of ecological footprint awareness, and the relationship between variables is highly significant  $p < 0.05$ .

**Table 3.** The relationship of the demographic variables to the environmental awareness

| Faculty and FootPrint Crosstabulation |         |      |       |      |       | ChildPlace and Father's Education Crosstabulation  |                    |    |                       |    |       |
|---------------------------------------|---------|------|-------|------|-------|----------------------------------------------------|--------------------|----|-----------------------|----|-------|
|                                       | Unaware |      | Aware |      | Total |                                                    | Father's Education |    |                       |    |       |
| Faculty                               | N       | %    | N     | %    |       | Child Place                                        | Elementary         | %  | High school and above | %  | Total |
| Medicine and Veterinary Medicine      | 32      | 71.1 | 13    | 28.9 | 45    | Village                                            | 15                 | 60 | 10                    | 40 | 25    |
| Science and Architecture              | 18      | 42.9 | 24    | 57.1 | 42    | Town                                               | 24                 | 70 | 10                    | 30 | 34    |
| Law and Administrative Sciences       | 13      | 56.5 | 10    | 43.5 | 23    | City                                               | 64                 | 50 | 64                    | 50 | 128   |
| Literature and Theology               | 16      | 44.4 | 20    | 55.6 | 36    | Total                                              | 103                | 55 | 84                    | 45 | 187   |
| Dentistry                             | 7       | 31.8 | 15    | 68.2 | 22    | Chi-Square                                         | Value              |    | df                    |    | p     |
| Pharmacy                              | 7       | 36.8 | 12    | 63.2 | 19    | Pearson                                            | 4.885              |    | 2                     |    | 0.087 |
| Total                                 | 93      | 49.7 | 94    | 50.3 | 187   |                                                    |                    |    |                       |    |       |
| Chi-Square                            | Value   |      | df    |      | p     | Marital Status and Ecological Footprint Tabulation |                    |    |                       |    |       |
| Pearson                               | 13.935a |      | 5     |      | .016  | Marital Status                                     | Unaware            |    | Aware                 |    | Total |
|                                       |         |      |       |      |       |                                                    | N                  | %  | N                     | %  |       |
| Degree and FootPrint Crosstabulation  |         |      |       |      |       | Single                                             | 37                 | 63 | 22                    | 37 | 59    |
| Degree                                | Unaware |      | Aware |      | Total | Married                                            | 56                 | 44 | 72                    | 56 | 128   |
|                                       | N       | %    | N     | %    |       | Total                                              | 93                 | 49 | 94                    | 51 | 187   |
| Research Assistant or Lecturer        | 33      | 49   | 35    | 51   | 68    | Chi-Square                                         | Value              |    | df                    |    | p     |
| Assistant or Associate Professor      | 45      | 57   | 34    | 43   | 79    | Pearson                                            | 5,808a             |    | 1                     |    | 0,016 |
| Professor                             | 15      | 38   | 25    | 63   | 40    |                                                    |                    |    |                       |    |       |
| Total                                 | 93      | 50   | 94    | 50   | 187   |                                                    |                    |    |                       |    |       |
| Chi-Square                            | Value   |      | df    |      | p     |                                                    |                    |    |                       |    |       |
| Pearson                               | 4,085   |      | 2     |      | 0,130 |                                                    |                    |    |                       |    |       |

**Table 4.** Awareness levels of the respondents by their affiliations and the footprint sub-dimensions

| Affiliation                      | Budget Sub-Dimension |             | Environment Sub-dimension |           | Food Sub-Dimension |           |
|----------------------------------|----------------------|-------------|---------------------------|-----------|--------------------|-----------|
|                                  | Unaware              | Aware       | Unaware                   | Aware     | Unaware            | Aware     |
| Medicine and Veterinary Medicine | 34                   | 11          | 27                        | 18        | 25                 | 20        |
| Science and Architecture         | 14                   | 28          | 17                        | 25        | 19                 | 23        |
| Law and Administrative Sciences  | 13                   | 10          | 15                        | 8         | 12                 | 11        |
| Literature and Theology          | 15                   | 21          | 15                        | 21        | 18                 | 18        |
| Dentistry                        | 4                    | 18          | 9                         | 13        | 10                 | 12        |
| Pharmacy                         | 8                    | 11          | 6                         | 13        | 9                  | 10        |
| Total                            | 88                   | 99          | 89                        | 98        | 93                 | 94        |
|                                  | $\chi^2 = 26,6$      | $P < 0,000$ | $\chi^2 = 9,3$            | $P < 0,1$ | $\chi^2 = 1,2$     | $p > 0,1$ |



In semi-structured surveys the reason for the environmentally friendly behaviours of the respondents in energy consumption and their opposite or careless behaviours in food consumption was examined. The respondents explained that being environmentally friendly also worked to their advantage in their budget. For example, turning off unused lights reduces electricity consumption, which positively impacts their bills.

Different areas determining the ecological footprints of the people exist. These areas consist of all activities in their life. These activities are examined in three sub-dimensions in the study and are given in *Table 4*. Number of respondents were given in *Table 4* by their affiliations and the sub-dimensions.

According to the results given in *Table 4*, the awareness levels of the respondents greatly differed by their affiliations and sub-dimensions. Ecological awareness was highest in the budget sub-dimension but lowest in the food sub-dimension. The differences among the affiliations became insignificant in the food sub-dimension. Thus, the food sub-dimension was found to have the lowest level of ecological footprint awareness, and the relationship between variables was insignificant ( $p>0.1$ ; *Table 4*).

### **Logistic regression analysis results**

Regression analysis results for the ten variables expected to be effective on the ecological footprint of the academicians are presented in *Table 5*.

**Table 5.** Logistic regression analysis results for the ecological footprint awareness of the academicians

| Explanatory Variables                              | Coefficient   | Std. Err.     | z            | p            | Marginal Effect<br>dy/dx |
|----------------------------------------------------|---------------|---------------|--------------|--------------|--------------------------|
| <b>Sex</b>                                         | <b>-1.396</b> | <b>0.352</b>  | <b>-3.96</b> | <b>0.000</b> | <b>-0.09</b>             |
| Age                                                | -0.007        | 0.023         | -0.3         | 0.763        | 0.00                     |
| <b>Place of Childhood</b>                          |               |               |              |              | -0.07                    |
| <b>District</b>                                    | <b>-0.997</b> | <b>0.483</b>  | <b>-2.06</b> | <b>0.039</b> | <b>-0.05</b>             |
| City                                               | -0.704        | 0.716         | -0.98        | 0.325        |                          |
| <b>Academic Rank</b>                               |               |               |              |              |                          |
| <b>Associate Professor</b>                         | <b>-0.929</b> | <b>-0.415</b> | <b>-2.24</b> | <b>0.025</b> | <b>-0.06</b>             |
| Professor                                          | -0.010        | 0.555         | -0.02        | 0.986        | 0.00                     |
| Mother's Education                                 | 0.503         | 0.527         | . 0.96       | 0.339        | 0.03                     |
| Father's education                                 | -1.095        | 0.350         | -3.13        | 0.002        | -0.07                    |
| Marital Status and the Spouse's<br>Education Level |               |               |              |              |                          |
| Elementary or Highschool                           | 1.271         | 1.107         | 1.15         | 0.251        | 0.09                     |
| Associate degree or higher                         | 0.014         | 1.019         | . 0.01       | 0.989        | 0.00                     |
| Faculty of Affiliation                             |               |               |              |              |                          |
| Science or Architecture                            | 0.784         | 0.571         | 1.37         | 0.170        | 0.05                     |
| Law or Administrative Sciences                     | 0.692         | 0.644         | 1.08         | 0.282        | 0.05                     |
| Literature or Theology                             | 0.529         | 0.450         | 1.17         | 0.24         | 0.04                     |
| <b>Dentistry</b>                                   | <b>1.370</b>  | <b>0.529</b>  | <b>0.53</b>  | <b>0.010</b> | <b>0.09</b>              |
| Pharmacy                                           | -0.221        | 0.305         | -0.72        | 0.469        | -0.02                    |
| Footprint Sub-Dimensions                           |               |               |              |              |                          |
| <b>Budget</b>                                      | <b>3.452</b>  | <b>0.589</b>  | <b>5.86</b>  | <b>0.000</b> | <b>0.31</b>              |
| <b>Environment</b>                                 | <b>4.734</b>  | <b>0.815</b>  | <b>5.81</b>  | <b>0.000</b> | <b>0.29</b>              |
| <b>Food</b>                                        | <b>2.205</b>  | <b>0.695</b>  | <b>3.17</b>  | <b>0.002</b> | <b>0.15</b>              |
| Constant                                           | -2.274        | 1.681         | -1.35        | -0.176       |                          |

Of all the ten variables, age, mother's education level, marital status, and spouse's education level were insignificant as the effect of gender was significant  $p < 0.05$ . It was predicted that a shift from female to male would decrease the possibility of ecological awareness by more than 9% at *ceteris paribus*. Sex is an important demographic characteristic and so was considered to be an important variable in related studies.

## Discussion

Akçay and Pekel (2017) found no significant relationship between environmental sensitivity and gender in their study. However, in a study conducted by Yaraş et al. (2011), it was reported that women's environmental awareness was higher than men's, with 74.2% and 70.3%, respectively, showing similar levels of environmental consciousness. Many studies report that older people exhibit more environmentally friendly behaviours than younger people (Swami et al., 2011; Pinto et al., 2011).

It is known from many studies that childhood experiences can explain some of the environmental anxiety (Gifford and Nilsson, 2014).

When the relationship between environmental attitudes and awareness was examined according to the faculty variable, it was observed that there was a difference between faculties and environmental awareness levels, and this difference was statistically significant  $p < 0.05$ . When the environmental awareness levels of the participants were compared according to their faculties, it was seen that the highest percentage belonged to the Faculty of Dentistry was 68.2% and the lowest percentage belonged to the Faculties of Medicine and Veterinary was 28.9% *Table 2*. It is known that knowledge is necessary but not sufficient on its own to motivate environmental behaviour (Steg and Vlek, 2009).

In male-dominated societies like Türkiye, the person who provides for the family is mostly men, and the place where men work is the place where the family settles. Based on this idea, it was observed that there was a statistically significant relationship  $p < 0.10$  between the place where the academicians spent his/her childhood, and his/her father's education level *Table 2*.

In their study, Özil et al., 2008 determined that there was a correlation between the education level and occupation of students' parents, and that students with higher family income levels were more aware of environmental issues.

The relationship between academic degrees and environmental awareness/unawareness was found to be statistically insignificant. It is known that people with higher academic ranks are naturally older. In other words, there is a linear relationship between academic rank and age. From this perspective age groups did not differ significantly regarding environmental awareness/unawareness. Current research generally shows that young people are less concerned about the environment than older people and are less likely to take environmentally responsible actions (Partridge, 2008).

However, in the relationship between marital status and ecological footprint, the difference observed between awareness and unawareness  $p < 0.05$  was found to be statistically significant (*Table 2*). Yılmaz (2009) reported 66,9% of environmental consciousness score for the singles as much higher as that of married couples (68.4%).

The high level of awareness among academicians in the budget sub-dimension means that they have reduced their ecological footprint in this sub-dimension. In semi-structured interviews, it was expressed by academicians that the reason for the high sensitivity in energy, transportation and housing was due to the high proportion of money spent on these items in the family budget. It has been stated by the academicians that the

consequences of the “lifestyle” in the aforementioned subjects is painful because it is reflected on the invoices immediately or in the short term. The wish in the conclusion of a research study conducted in Canada in 2009 on this subject, stating that practitioners as well as other social scientists would produce policies in which the effect of household and community play a strong role instead of the prioritization that emphasizes financial, and consumer sovereignty has still not come true (Kennedy et al., 2009).

In semi-structured surveys the reason for the environmentally friendly behaviours of the respondents in energy consumption and their opposite or careless behaviours in food consumption was examined. The respondents explained that being environmentally friendly also worked to their advantage in their budget. For example, turning off unused lights reduces electricity consumption, which positively impacts their bills.

It was determined that the environmental waste sub-dimension ranked second in influencing ecological footprint awareness, and the relationship between the variables is marginally significant  $p < 0.10$  (Table 3). When asked to evaluate this result in the interviews, it was claimed that waste was a tangible reality causing discomfort. It was also noted that it would be quite humiliating to live in a waste-polluted environment.

The food sub-dimension was found to have the lowest level of ecological footprint awareness, and the relationship between variables was not significant Table 3.

Kennedy et al. (2009) have stated that “most of us have core values that guide our behavior, but when one value is violated, we can act according to another. For example, many people see the environmental benefits of choosing or consuming organically grown food. However, someone who also values frugality may feel conflicted when offered organic products if they are significantly more expensive than the cost of conventionally produced food (Kennedy et al., 2009). In an article examining the relationship between ecological footprint, nature connection and environmentally friendly attitudes conducted in Spain, it was found that all participants studying at different universities had higher food footprints (Fernandez et al., 2020)

Kennedy et al. (2009) stated that most of us had core values that guide our behavior, but when one value was violated, we could act according to another. For example, many people see the environmental benefits of choosing or consuming organically grown foods. However, someone who also values frugality may feel conflicted when offered organic products if they are significantly more expensive than the cost of conventionally produced food (Kennedy et al., 2009). In a study examining the relationship between ecological footprint, nature connection and environmentally friendly attitudes conducted in Spain, it was found that all participants studying at different universities had higher food footprints (Fernandez et al., 2020).

When questioned the reason for the lowest ecological awareness regarding the food dimension the results of the semi-structured interviews revealed that the consequences of the food consumption were not immediately visible and tangible. Moreover, inability to take always the same care due to the necessity of regular food intake, popular eating habits, and poor access to healthy foods were the other reasons for the low awareness in this regard.

Being in harmony with our findings Çabuk et al. (2008) emphasized that women had higher environmental awareness than men. Han et al. (2010) also share the same opinion that the relationship between women and environmental consciousness is stronger. In the study titled "Reasons for the Differentiation of the Attitudes of Female and Male Students towards the Environment: Teachers and Parents Opinions" by Gökçe and Sarıyar (2019), it was found that female students have higher attitudes towards the environment than male

students. On the other hand, in a study by Akyüz et al. (2016) examining the ecological impacts of academics, it was determined that female academicians and the academicians under the age of 35 had higher Ecological Footprint.

Another demographic characteristic that affects attitudes towards individual behaviors is the place where one grew up as a child. In the study, it was seen that there was a meaningful difference between the two groups of academicians, one grew up in villages and those who grew up in towns, and that an increase in the number of people living in towns would increase the ecological footprint negatively by 4% at *ceteris paribus*. According to Chawla (2001) and Hsu (2009), who based their studies on data collected about people's childhoods, adults who grew up in rural areas, in other words, those who spent more time in nature, have more environmentally friendly behaviors.

Another factor that influences individuals' behavior patterns is the individual's social position or rank in a society or community. Although the Chi square analysis in *Table 2* did not reveal a significant relationship between the academic rank and the environmental awareness, logistic regression results suggest that a shift from the reference category research assistant or lecturer here to associate professor causes a significant decrease  $p < 0.05$  in environmental awareness by about 6 per cent at *ceteris paribus*. However, there is no statistically significant difference between the reference category and the professorship degree in spite of the similar negative trend. Whereas in their similar study, Eren et al. (2017) argued that professors had the highest but insignificant carbon footprints in all academic titles.

Logistic regression results also revealed that father's education level had a negative and significant effect on the academicians' ecological footprint  $p < 0.01$ . The logistic regression model suggests that academicians whose father's education is at high school level or above are 7% less likely to have ecological awareness than those whose fathers have less level of education.

The impacts of the budget, environment and food sub-dimensions on ecological footprint were found to be statistically very significant  $p < 0.01$ . The model suggests that money saving, ecologically friendly and healthy eating attitudes increase the likelihoods of the ecological footprint by 31%, 29% and 15% respectively at *ceteris paribus*.

In many studies, individuals' areas of expertise or professions are considered as demographic characteristics. In Albayrak's study, it was found that there was no statistical difference in environmental awareness among professional groups such as biologists, forestry engineers, and civil engineers in Antalya (Albayrak, 2005).

In line with this, the model suggested that only the dentistry academicians were significantly differed from the rest of the academicians regarding ecological footprint  $p < 0.05$ .

Chuvieco et al. (2018) analyzed the environmental habits of university students in Spain, Brazil, and the United Arab Emirates. The results revealed that students' sustainability habits were influenced by the subject area studied and their own perceived environmental commitment, but no relationship was found with respect to the year of study.

## Conclusions

Ecological problems are among the problems that we have increasingly experienced their dramatic effects in recent years and unfortunately their effects will inevitably be reflected on future generations. It is generally assumed that as the level of education

increases, individuals become more knowledgeable about the environment, and this enhances their environmental awareness.

In this study, it was aimed to reveal whether the impact of education on ecological footprint is significant and what other factors are effective on it. To this end, instead of sampling all segments of society, academics, the most educated segment were purposively selected. Based on the "ecological footprints" of academicians, at the case of Dicle University, the factors affecting their environmental perspectives and behaviours and the degree of their impact were investigated.

Study revealed that there was a negative and significant relationship between "father's education level" and ecological footprint.

This could be explained with the father's breadwinner role in the family. That is, there is a close correlation between the fathers' education level and the living place of the family. It is most likely that families with more educated breadwinners live in cities or towns. The higher the education level of the father, the more likely the family live in a town or city far from the village and rural areas.

Childhood spent in cities negatively affects environmental awareness. It is an important issue to emphasize on that there is a need especially for the young individuals to grow up in nature to be able to develop environmental awareness, and to respect nature by learning that every living thing is the part of nature.

In achieving this, practical lessons can be implemented in nature. Planning and doing summer schools and internships in rural areas can contribute to developing environmental awareness of the individuals at their early ages of physical and mental development.

Study revealed that research assistants and assistant professors had more environmental awareness compared to the academicians in higher ranks. This could be explained by higher energy use of the high-ranked academicians for transportation due to the increases in time costs caused by enhanced welfare brought about by aging and academic promotion.

Welfare increases and academic promotions are undoubtedly desired results, but they cause high ecological footprints. Therefore, it is necessary to encourage the use of environmentally friendly energy sources in transportation. Moreover, the taxes on green energy sources may be abandoned or at least their rates should be reduced to encourage the use of clean energy.

According to the research results, the budget sub-dimension affects the ecological footprint the most since it is reflected in the bill and directly relates to the wallet.

Since a certain amount of consumption is necessary for the maintenance requirements, the higher pricing for excessive use over a certain threshold may be deterrent towards reducing the ecological footprint.

Environment sub-dimension ranks second in importance to affect the ecological footprint. It is no doubt that a visibly polluted environment is irritating. Within their efforts to reduce ecological footprint in their mandate areas, municipalities should consider using recycling bins to sort out the waste. Rewarding children even with small cash payments for taking their glass and plastic wastes to recycling bins with the guidance of their families, will excites them greatly and ultimately help them develop permanent behavior change in reducing the ecological footprint and improving the environmental awareness.

Another result revealed by the study was that food sub-dimension ranked third in importance to affect the ecological food print after budget and environment sub-dimensions. This can be explained with its immediate effects on the wallet and delayed

effects on health. That is, consumers tend to prefer cheap foods ignoring their possible negative effects on their health since they are not visible in the short run. In this context, it may be of beneficial to share unhealthy food related research results with the public through mass media, or to add mandatory warnings on labels of foods with unhealthy additives, similar to those on cigarette packages. Contrary to what was assumed in the research, study revealed that the most important dimension of the environmental awareness of academicians is the budget dimension, and academic degree does not influence the level of environmental awareness. Therefore, it has been concluded that the most effective solution to reduce the pressure on the environment might be to pass the environmental costs on to the individuals.

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